

# PATENT SPECIFICATION

## DRAWINGS ATTACHED

L172052



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### COMPLETE SPECIFICATION

#### Vacuum-forming Apparatus for Forming Recesses in Thermoplastic Films

We, OTTO HÖFLIGER, a German Citizen and RUDOLF KARG, a German Citizen, trading as HÖFLIGER & KARG, of Postfach 118, Heerstrasse, 7050 Waiblingen bei Stuttgart, Germany, do hereby declare the invention for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to vacuum-forming apparatus comprising a rotary drum the periphery of which is provided with recesses for forming depressions in a heated synthetic thermoplastic film web, rotation of the drum serving to bring the recesses periodically into communication with a vacuum source, and comprising retaining means being provided for causing marginal portions of the film web to be held in air-tight contact with the drum's periphery.

In a prior known construction, the retaining means takes the form of travelling endless wire ropes which extend around the drum which is formed with peripheral grooves for engagement therein of the ropes which force marginal portions of film web into air-tight engagement against the drum. Arrangements of this kind are expensive and occupy a considerable amount of space, since guide rollers and tensioning devices are required for the wire ropes.

An object of the invention is to provide vacuum-forming apparatus having retaining means, for the film web, which can be produced at minimum cost and which takes up no extra space.

With this object in view, the present invention provides vacuum-forming apparatus comprising a rotary drum the periphery of which is provided with recesses for forming depressions in a heated synthetic thermoplastic film web, rotation of the drum serv-

ing to bring the recesses periodically into communication with a vacuum source, and comprising retaining means for causing marginal portions of the web to be held in air-tight contact with the drum's periphery wherein the retaining means includes indentations provided at intervals around the drum's periphery adjacent the edges thereof, which indentations are also brought periodically, by rotation of the drum, into communication with a vacuum source.

The invention will be described further, by way of example, with reference to the accompanying drawings, wherein:—

Fig. 1 is a diagrammatic side view of a practical embodiment of the apparatus of the invention, the upper half of the drum being shown in section corresponding to the line A—B of Fig. 2; and

Fig. 2 is a diagrammatic end view, taken in the direction A indicated in Fig. 1, of the apparatus, the drum being partly shown in section, and a film web being supplied to the drum.

The illustrated vacuum-forming apparatus comprises a rotary drum 1, made of brass, aluminium or any other suitable material, and formed with recesses 2 uniformly distributed over its periphery. Viewed in the axial direction of the drum 1, two adjacent groups 3, 4 of three of the recesses 2 form a line or row across the drum's periphery only two of such groups 3, 4 having been shown in full to simplify the drawing. The lines or rows are uniformly spaced around the drum's periphery, and associated with each such line or row is a respective passage 5 which opens to one end face of the drum 1 and communicates, via openings 6, with the corresponding individual recesses 2. Rotation of the drum brings the open ends of the passages 5 periodically into communication

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with a suction slot 7 in a stationary ring 8 on which the said one end face of the drum slides, which slot 7 is in communication with a suction source via a line 9; in the same way, the open ends of the passages 5 are periodically brought into communication with a pressure slot 10, formed in the ring 8, for the supply of compressed air to the passages 5 via a line 11. At each end of each line or row of the recess 2, the drum periphery is provided, adjacent its edges, with shallow indentations 12 also communicating via bores 13, with the respective passages 5. To improve cooling, the inner periphery of the drum 1 has cooling fins 14. The reference numeral 17 denotes a heating zone provided by a heating device 15.

When a film web 16 is supplied to the drum 1, operation of the apparatus is as follows:

The film web 16 running on to the drum 1 and engaged thereby firstly passes through the heating zone 17 wherein the film is heated to convert it into the plastic state required for vacuum-forming. Thereupon, the web 16 enters the zone of the suction slot 7, and a vacuum builds up in the passages 5, the bores 12, and therefore in the recess 2 which draws corresponding areas of the film into the recess 2, so as to form depressions in the web. Simultaneously, the areas of the film above the indentations 12 are drawn slightly thereinto, whereby a firm hold on the film and a well defined position thereof is obtained and maintained, this preventing distortion of the web and ensuring that the marginal portions of the film are held in air-tight contact with the drum's periphery. After the depressions have been formed in the web, the latter is drawn off the drum, whereafter compressed air is supplied to the passages 5 and the recesses 2, to cool the drum 1 and to prevent the heating effect of the device 15 becoming cumulative, by the rotation of

the drum 1 bringing the passages 5 into register with the pressure slot 10.

#### WHAT WE CLAIM IS:—

1. Vacuum-forming apparatus comprising a rotary drum the periphery of which is provided with recesses for forming depressions in a heated synthetic thermoplastic film web, rotation of the drum serving to bring the recesses periodically into communication with a vacuum source, and comprising retaining means for causing marginal portions of the web to be held in air-tight contact with the drum's periphery wherein the retaining means includes indentations provided at intervals around the drum's periphery adjacent the edges thereof, which indentations are also brought periodically, by rotation of the drum, into communication with a vacuum source.

2. Apparatus as claimed in Claim 1, wherein one end face of the drum slides on a stationary ring which presents to said end face, suction and pressure slots which respectively communicate with sources of suction and compressed air, and passages, leading through the drum to the recesses and indentations, open to said end face.

3. Apparatus as claimed in Claim 2 wherein each of the passages connects with a respective line or group of the recesses and corresponding ones of the indentations.

4. Apparatus as claimed in Claims 1, 2 or 3, wherein the indentations are uniformly spaced in two circumferential rows one adjacent each edge of the drum's periphery.

5. Vacuum-forming apparatus substantially as hereinbefore described with reference to and as illustrated in the accompanying drawings.

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## COMPLETE SPECIFICATION

1 SHEET

1 SHEET This drawing is a reproduction of the Original on a reduced scale

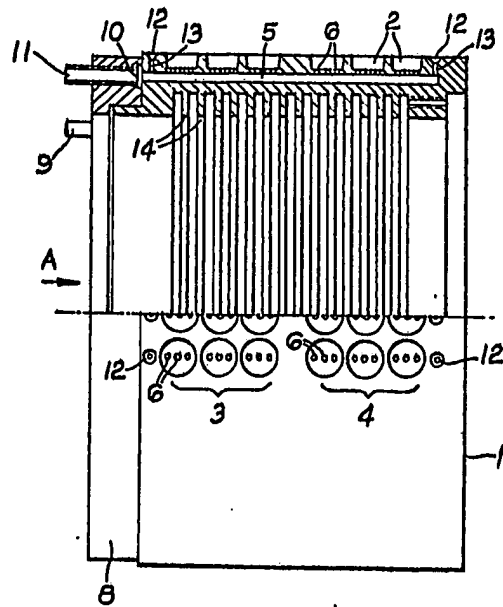


Fig. 1.

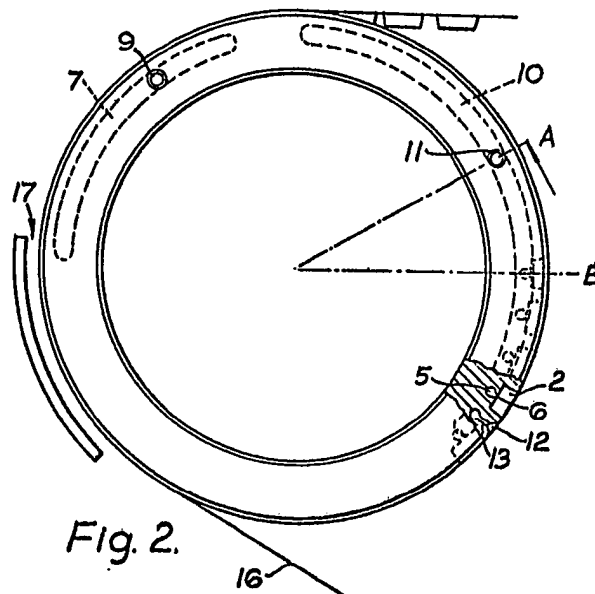


Fig. 2.